

Next generation global Earth atmospheric composition sounders for the decadal survey requirements and roadmaps (GACM)

Completed Technology Project (2013 - 2017)



Project Introduction

This task follows directly from an "A Team" study conducted in April 2013 to identify the future space based atmospheric composition measurements required to inform future climate and air quality research, public policy, and air quality forecasting following the completion of the Aqua and Aura missions. A group of representatives from across the atmospheric composition community at JPL participated and of the concepts proposed, the most compelling and tractable investigations – 1. developing a predictive capability for global tropospheric ozone and 2. understanding the impact of changing water vapor concentrations in the stratosphere and upper troposphere on climate -- were selected for further study through this program as promising topics around which to base a future Earth Science Decadal Survey mission. This three-year effort to develop measurement requirements for future global atmospheric composition observations needed to provide a quantitative understanding of key processes affecting atmospheric composition and its impact on climate. We further propose to advance the technology of specific low-cost instrument concepts that are suited to deliver these measurements, namely: a simplified microwave limb sounder and, depending on the results of the first year's study, either an immersed grating or Fourier transform spectrometer (FTS). This project will lead to the generation of one or more "white papers" to be submitted to the upcoming Earth science decadal survey. These will make the scientific case for the measurements and outline mission concepts for delivering the required measurements with mature technology at modest cost. There are two overall objectives: 1. Define the spatial resolutions and sensitivities required for the instruments; 2. Mature the technology for the limb sounder and the selected spectrometer. Work in the first year is focused on strengthening the case for the observations and establishing requirements for spatial resolution. The resolution study in turn dictates the preferred implementation route for the short wave infrared (SWIR) and thermal infrared (TIR) observations (interferometer vs. grating spectrometer). Work in the second and third years centers on technology maturation for the infrared and limb microwave sensors.

Anticipated Benefits

The proposed work will provide the follow on instruments that will enable the most important measurements from Aura and Aqua to continue after Aura and Aqua have completed their mission.



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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Jonas Zmuidzinis

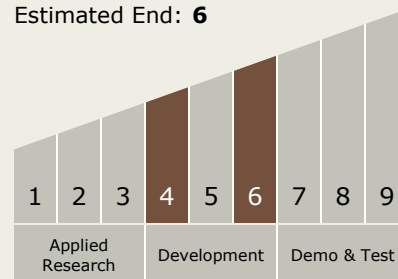
Principal Investigator:

Paul C Stek

Technology Maturity (TRL)

Start: **4**

Estimated End: **6**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves